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NOTES ON THE FALL WEBWORM (HYPHANTRIA CUNEA) IN OHIO.*

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The majority of the observations upon which this paper is based were made at Cedar Point, Sandusky, Ohio, during the past summer while the writer was at the Lake Laboratory of the Ohio State University. The webs of this caterpillar were abundant on all sides and those who had spent preceding summers at Cedar Point were under the impression that the Webworm was on the increase. After a few days of casual observation it was decided to make a more careful study of its habits, and, if possible, to determine whether it is double brooded at that place.

While a few specimens pupated in the laboratory during the latter part of July, none of them transformed into adults, and no positive results were obtained in regard to a possible second brood.

Acknowledgment is due Professor Osborn for his interest and generosity with valuable suggestions and facilities placed at the writer's command.

Food Plants.—The worms were observed upon the following trees: Walnut (*Juglans nigra* L.), Choke-cherry (*Prunus virginiana* L.), Common Wild Black Cherry (*Prunus serotina* Ehr), Willow (*Salix* sp.), Elm (*Ulmus americana* L), Box-wood (*Cornus florida* L), Hackberry (*Celtis occidentalis* L), and Wild Grape

* Abstract of paper read December 2, Cincinnati, Ohio State Acad. of Sci.

(*Vitis vulpina* L). The webs were abundant everywhere upon the choke-cherry and the common wild black cherry, some trees of the latter kind having nearly half of their foliage destroyed. Willows were also nearly always populated by a few or many broods. The few walnut trees were literally defoliated, and this will be the subject of the next topic. Elm, box-wood and hackberry were frequently infested but never to the same extent as the previously named trees. In only two instances did I observe the worms feeding upon the wild grape, and then only when the grape leaves grew in among the leaves of willow and choke-cherry. I did not observe a single instance of the worms feeding upon the poplars at the Point. This is quite at variance with other observations in which poplars of all kinds were generally much infested. Thus, in Riley's report upon the Webworm in Washington in 1886 ("Our Shade Trees and Their Insect Defoliators") *Populus balsamifera* L) and *P. tremuloides* Mx. are named among the trees that suffered most. Both these poplars occur at Cedar Point but no webs were observed upon them.

Following I give the first five trees named in Riley's list of 108 food plants for Washington. These are arranged according to the damage suffered. *Negundo aceroides* Moench (Box Elder), *Populus alba* L (European White Poplar), *P. monilifera* Aiton (Cottonwood), *P. balsamifera* L (Balsam Poplar).

The same report further states that poplars, cottonwoods and the ranker growing willows were the principal subjects of attack in 1886 in New England.

Of the species of trees attacked at Cedar Point, four, walnut, wild black cherry, choke-cherry and willow appeared to be the favorite food of the worms, and these are respectively 41, 75 and 14, in Riley's list. (The common wild cherry is not named in his list, and its place among the above figures is indicated by a question mark.) Again, of all the species of plants named by Riley forty-two genera and about twenty-six species are found at Cedar Point; but of these only eight were observed to be used as food by the worms.

Throughout the State generally, so far as my limited observations extend, and from a few other reports, the common wild black cherry is the tree most generally attacked; but walnut, elm, hickory, pear, apple, sugar and silver maple, all suffer more or less. Of these, walnuts, when attacked suffer most, as the following topic will show; and Mr. Cotton, Assistant Inspector of Orchards and Nurseries, has informed me of similar conditions in other parts of the State.

The following observation is interesting as it shows the discrimination with which the female moth selects the food plants upon which she deposits her eggs. One day I observed a web

upon a hedge of osage orange, at Berea, Ohio. Closer investigation, however, revealed the fact that the web was not upon the osage orange at all, but upon a small wild cherry tree that grew in the hedge and which had escaped my notice.

Walnut Trees.—Only a few walnut trees exist at the Point, but the worms played havoc with these, while of all the great abundance of choke-cherry, only two instances were noted where the infection was at all so extensive. A clump of five walnut trees (each about six inches in diameter), became literally defoliated and about 150 nests were counted upon them. I have observed, however, that the number of webs does not necessarily indicate the number of broods, since a large brood may desert its old nest, and build a new one, or divide and form two new nests. (I use "nest" to distinguish the denser part of the web. See also *Other Observations*.)

When food became scarce the worms began to migrate down the trunks of the trees, here and there covering the limbs and trunks with web. This migration occurred chiefly at night, the worms generally resting, as usual during the day, in temporary webs frequently located at the base of the trees and of extraordinary size. In one instance I estimated that not less than two quarts of worms occupied a certain web.

In the early part of the forenoon I usually found some stragglers which had been overtaken by daylight, evidently en route from the trees. Many of these were found dead in small pits, from which, as experiment showed, they had been unable to extricate themselves, and had died from the excessive heat.

The worms migrated mainly eastward to a clump of choke-cherry nearby and westward to a large hackberry about forty feet distant. This migration continued during about ten days. In four days the number of nests in the choke-cherry bush increased from six to twenty-five and the bush was literally stripped as the worms advanced.

The migration to the hackberry was not so striking as that to the choke-cherry bush but even more interesting. At first the worms congregated in the crotches of the larger limbs but advanced upward from day to day and formed webs in the smaller branches. They soon began to strip the leaves and the webs could then be seen at some distance from the outside of the tree.

Mr. W. B. Herms, who remained at the Laboratory until August 31st, was kind enough to observe the worms for me and reported that after my departure the worms migrated only a little farther east into the choke-cherry bushes and became fewer in number. I presume that they were then mature and that they wandered away to pupate. The trees began to show new life and by the time Mr. Herms left were quite green again.

A small hoptree (*Ptelea trifoliata*) immediately beneath the webs in the walnuts was injured but very little, the worms having a decided aversion for it.

Feeding.—My observations in this direction clearly show that the worms feed but little if at all during the day. At night they leave the nests, or thicker parts of the webs, and move about freely. Some will even leave the protection of the thinner parts of the web and feed unprotected except by the darkness. (I do not mean to assert, however, that there were no threads of silk leading back from the worms to their web.)

Growth and Moulting.—By actual measurement of worms in a certain brood I found that they increased in length about one-fourth of an inch in twenty-two days, i. e., they increased in length from one-fourth to one-half inch. At that rate it would take about two months for a worm to mature, which appears to be about the time required at Cedar Point.

The observations that I succeeded in making upon moulting give me twelve to fifteen days as the interval, the interval from birth to the first moult included. Allowing five moults per season, this would again give us about two months for a worm to become mature. Mature worms probably average from three-fourths to one inch in length.

The heads moult first, the skin of the head drops off, and the worm then crawls out of the opening. The thorax rarely splits dorsally.

Other Observations.—I have previously remarked that a brood may divide, each part building a new nest. This I actually observed in several instances. Again, two broods may unite into one brood or a brood may desert its old nest and build a new one.

In one instance I cut out a nest while the worms were out feeding. Upon their return at daylight they wandered about aimlessly for a while, when one portion settled down and formed a new nest, while the rest returned to an empty nest nearby from which a part of the brood in question, a double brood, had come some days before.

Of three nests cut out and placed upon the ground near some bushes, the worms of one nest were back upon the bush in a new web the morning of the second day, while those of the other two nests gradually disappeared and apparently migrated to the bushes.

The appreciable economic loss from the webworm is probably not great, and but few trees are ever endangered; except small trees, which latter may easily become denuded of all their foliage by one or a few broods.

Biological Hall, O. S. U., Columbus, December 5, 1905.